

Claims

1. A pressure-sensitive adhesive tape with a flat carrier material which is coated on both sides with a pressure-sensitive adhesive, characterized in that at least one side of the carrier material is coated with a polymer-based pressure-sensitive adhesive which is preparable from a monomer mixture comprising at least the following components:

i.a) 49.5% - 89.5% by weight (based on the monomer mixture) of acrylic esters and/or methacrylic esters and/or the corresponding free acids with the following formula:



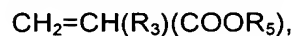
where $\text{R}_1 = \text{H}$ or CH_3 and R_2 is an alkyl radical having 1 to 10 carbon atoms or H and the homopolymer possesses a static glass transition temperature of $< -30^\circ\text{C}$;

i.b) 10% to 40% by weight (based on the monomer mixture) of acrylic esters and/or methacrylic esters with the following formula:



where $\text{R}_3 = \text{H}$ or CH_3 and R_4 is a cyclic alkyl radical having at least 8 carbon atoms or a linear alkyl radical having at least 12 carbon atoms and the homopolymer possesses a static glass transition temperature of at least 30°C ;

i.c) 0.5% - 10% by weight (based on the monomer mixture) of acrylic esters and/or methacrylic esters with the following formula:



where $\text{R}_3 = \text{H}$ or CH_3 and $\text{R}_5 = \text{H}$ or an aliphatic radical containing a functional group X, X comprising COOH , OH , $-\text{NH}$, NH_2 , SH , SO_3H , and the homopolymer possesses a static glass transition temperature of at least 30°C .

2. The pressure-sensitive adhesive tape of claim 1, characterized in that the polymers of the polymer-based pressure-sensitive adhesive have a molar mass M_n of between about 10 000 and about 600 000 g/mol, preferably between about 30 000 and about 400 000 g/mol, more preferably between about 50 000 and about 300 000.

3. The pressure-sensitive adhesive tape of one of claims 1 or 2, characterized in that the polymers of the polymer-based pressure-sensitive adhesive have been crosslinked.

4. The pressure-sensitive adhesive tape of any one of the preceding claims 1 to 3, characterized in that the polymer chains of the polymer-based pressure-sensitive adhesive are present in a branched state as graft polymers.
- 5 5. The pressure-sensitive adhesive tape of any one of the preceding claims 1 to 4, characterized in that tackifier resins have been admixed to the pressure-sensitive adhesives.
6. The pressure-sensitive adhesive tape of claim 5, characterized in that the weight
10 fraction of the tackifier resins as a proportion of the polymer is up to 40% by weight, preferably up to 30% by weight.
7. The pressure-sensitive adhesive tape of any one of the preceding claims 1 to 6,
15 characterized in that to the polymer-based pressure-sensitive adhesive further additives, especially plasticizers, fillers, preferably fibers, carbon black, zinc oxide, titanium oxide, chalk, solid glass beads, hollow glass beads, microbeads of other materials, silica and/or silicates, nucleators, expandants, compounding agents and/or aging inhibitors, especially primary and secondary antioxidants and/or light stabilizers.
- 20 8. The pressure-sensitive adhesive tape of any one of the preceding claims 1 to 7, characterized in that the carrier material is a film, in particular a film of polyester, PET, PE, PP, BOPP or PVC.
9. The pressure-sensitive adhesive tape of any one of the preceding claims 1 to 8,
25 characterized in that the carrier material is a foam carrier, in particular a polymer foam, consisting preferably of PU, PVC or polyolefin, more preferably consisting of PE or PP.
10. The pressure-sensitive adhesive tape of any one of the preceding claims 1 to 9,
30 characterized in that as a carrier material it comprises a combination of a film and at least one foam carrier, the film being connected, in particular by adhesive bonding, to the at least one foam carrier.
11. The pressure-sensitive adhesive tape of any one of claims 8 to 10, characterized
35 in that the film is a film made of PET, in particular with a thickness of 5 to 500 μm , preferably 5 to 60 μm , with particular preference 23 μm .

12. The pressure-sensitive adhesive tape of any one of the preceding claims 1 to 11, characterized in that the carrier material has been pretreated physically, in particular by flame, corona and/or plasma, and/or chemically, in particular by etching, partial etching
5 and/or by provision with primer, preferably reactive primer.

13. The pressure-sensitive adhesive tape of any one of the preceding claims 1 to 12, characterized in that it has on one or both sides a liner, in particular a paper or film liner, preferably made of double-sidedly siliconized film.

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14. The pressure-sensitive adhesive tape of any one of the preceding claims 2 to 13, characterized in that the two sides of the adhesive tape have pressure-sensitive adhesives differing in bond strength.

15. A free-radical polymerization method of producing a polymer-based pressure-sensitive adhesive, in particular for producing a pressure-sensitive adhesive tape of any one of claims 1 to 14, in which a reaction solution of a monomer mixture, in particular comprising at least the following components:

20 i.a) 49.5% - 89.5% by weight (based on the monomer mixture) of acrylic esters and/or methacrylic esters and/or the corresponding free acids with the following formula:
$$\text{CH}_2=\text{CH}(\text{R}_1)(\text{COOR}_2),$$

where $\text{R}_1 = \text{H}$ or CH_3 and R_2 is an alkyl radical having 1 to 10 carbon atoms or H and the homopolymer possesses a static glass transition temperature of $< -30^\circ\text{C}$;

25 i.b) 10% to 40% by weight (based on the monomer mixture) of acrylic esters and/or methacrylic esters with the following formula:
$$\text{CH}_2=\text{CH}(\text{R}_3)(\text{COOR}_4),$$

where $\text{R}_3 = \text{H}$ or CH_3 and R_4 is a cyclic alkyl radical having at least 8 carbon atoms or a linear alkyl radical having at least 12 carbon atoms and the
30 homopolymer possesses a static glass transition temperature of at least 30°C ;

i.c) 0.5% - 10% by weight (based on the monomer mixture) of acrylic esters and/or methacrylic esters with the following formula:
$$\text{CH}_2=\text{CH}(\text{R}_3)(\text{COOR}_5),$$

where $R_3 = H$ or CH_3 and $R_5 = H$ or an aliphatic radical containing a functional group X, X comprising $COOH$, OH , $-NH$, NH_2 , SH , SO_3H , and the homopolymer possesses a static glass transition temperature of at least $30^\circ C$,

5 with the addition of an initiator having a grafting activity of $\varepsilon < 5$ and of an initiator having a grafting activity of $\varepsilon > 5$, is prepared, and the resulting polymers are crosslinked.

16. The method of claim 15, characterized in that first the initiator having a grafting activity of $\varepsilon < 5$ is added for the linear polymerization and then the initiator having a grafting activity of $\varepsilon > 5$ is added for the graft polymerization of the reaction solution.

17. The method of claim 16, characterized in that after the initiator having a grafting activity of $\varepsilon < 5$ has been added and before the initiator having a grafting activity of $\varepsilon > 5$ has been added, initiation is repeated at least once with an initiator having a grafting activity of $\varepsilon < 5$.

18. The method of any one of claims 15 to 17, characterized in that the reaction is controlled by diluting the reaction solution in accordance with the viscosity of the polymer.

20 19. The method of any one of claims 15 to 18, characterized in that the polymerization is carried out at a temperature of $50 - 90^\circ C$.

20. The method of any one of claims 15 to 19, characterized in that the initiator having a grafting activity of $\varepsilon > 5$ is used in an amount of up to 2% by weight, based on the monomer mixture.

21. The method of any one of claims 15 to 20, characterized in that the initiator having a grafting activity of $\varepsilon > 5$ has a grafting activity of $\varepsilon > 10$ and in particular is bis(4-tert-butylcyclohexyl) peroxide dicarbonate or dibenzoyl peroxide.

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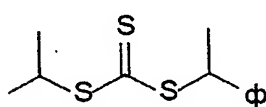
22. The method of any one of claims 15 to 21, characterized in that the initiator having a grafting activity of $\varepsilon < 5$ comprises azo initiators, especially azoisobutyronitrile or derivatives thereof, preferably 2,2-azobis(2-methylbutyronitrile).

23. The method of any one of claims 15 to 22, characterized in that the polymerization is carried out to a conversion of at least 90%, in particular at least 95%.

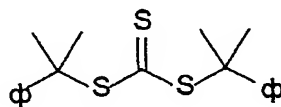
24. The method of any one of claims 15 to 23, characterized in that the method is carried out as a controlled polymerization, in particular with the addition of regulator substances.

25. The method of claim 24, characterized in that as regulator substance use is made of at least one from the group of 2,2,5,5-tetramethyl-1-pyrrolidinyloxy (PROXYL), 3-carbamoyl-PROXYL, 2,2-dimethyl-4,5-cyclohexyl-PROXYL, 3-oxo-PROXYL, 3-hydroxyimine-PROXYL, 3-aminomethyl-PROXYL, 3-methoxy-PROXYL, 3-t-butyl-PROXYL, 3,4-di-t-butyl-PROXYL; 2,2,6,6-tetramethyl-1-piperidinyloxy-pyrrolidinyloxy (TEMPO), 4-benzoyloxy-TEMPO, 4-methoxy-TEMPO, 4-chloro-TEMPO, 4-hydroxy-TEMPO, 4-oxo-TEMPO, 4-amino-TEMPO, 2,2,6,6-tetraethyl-1-piperidinyloxy, 2,2,6-trimethyl-6-ethyl-1-piperidinyloxy, N-tert-butyl 1-phenyl-2-methylpropyl nitroxide, N-tert-butyl 1-(2-naphthyl)-2-methylpropyl nitroxide, N-tert-butyl 1-diethylphosphono-2,2-dimethylpropyl nitroxide, N-tert-butyl 1-dibenzylphosphono-2,2-dimethylpropyl nitroxide, N-(1-phenyl-2-methylpropyl) 1-diethylphosphono-1-methylethyl nitroxide, di-t-butyl nitroxide, diphenyl nitroxide, tert-butyl tert-amyl nitroxide.

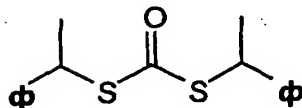
26. The method of one of claims 24 or 25, characterized in that the controlled polymerization is a variant of the RAFT polymerization, in which preferably the trithiocarbonates TTC1 and TTC2 or the thio compounds THI1 and THI2 or the thioesters THE are used, Φ



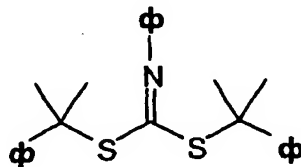
(TTC 1)



(TTC 2)



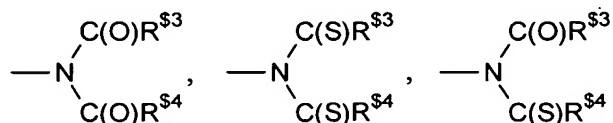
(THI 1)



(THI 2)

being an unfunctionalized phenyl group or a phenyl group functionalized with alkyl or aryl substituents attached directly or via ester or ether bridges, a functionalized phenyl group, functionalized preferably with halogen, hydroxyl, epoxy and/or nitrogen-containing or sulfur-containing groups, a cyano group or a saturated or unsaturated aliphatic radical, and where R^{S1} and R^{S2} are chosen independently of one another and R^{S1} can be a radical from one of groups i) to iv) below, and R^{S2} a radical from one of groups i) to iii) below:

- i) C_1 to C_{18} alkyl, C_2 to C_{18} alkenyl, C_2 to C_{18} alkynyl, each linear or branched; aryl, phenyl, benzyl, aliphatic and aromatic heterocycles.



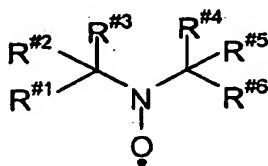
- ii) $-\text{NH}_2$, $-\text{NH-R}^{S3}$, $-\text{NR}^{S3}\text{R}^{S4}$, $-\text{NH-C(O)-R}^{S3}$, $-\text{NR}^{S3}-\text{C(O)-R}^{S4}$, $-\text{NH-C(S)-R}^{S3}$, $-\text{NR}^{S3}-\text{C(S)-R}^{S4}$, where R^{S3} and R^{S4} are radicals selected independently of one another from group i).

- iii) $-\text{S-R}^{S5}$ or $-\text{S-C(S)-R}^{S5}$, R^{S5} preferably being a radical from one of groups i) or ii).

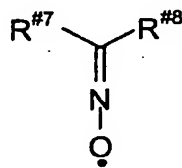
- iv) $-\text{O-R}^{S6}$ or $-\text{O-C(O)-R}^{S6}$, R^{S6} preferably being a radical from one of groups i) or ii).

27. The method of any one of claims 24 to 26, characterized in that the controlled polymerization is a variant of ATRP polymerization.

28. The method of any one of claims 15 to 27, characterized in that radical stabilization is effected using polymer-bonded or non-polymer-bonded nitroxides of the type (NIT 1) or (NIT 2):



(NIT 1)



(NIT 2)

where $R^{#1}$, $R^{#2}$, $R^{#3}$, $R^{#4}$, $R^{#5}$, $R^{#6}$, $R^{#7}$ and $R^{#8}$ independently of one another can denote the following groups:

- i) halides,
- ii) linear, branched, cyclic and heterocyclic hydrocarbons having 1 to 20 carbon atoms, which may be saturated, unsaturated or aromatic;
- iii) $-\text{COOR}^{#9}$, $-\text{OR}^{#10}$ and $-\text{PO}(\text{OR}^{#11})_2$, where $R^{#9}$, $R^{#10}$ and $R^{#11}$ stand for radicals from group ii).

29. The method of any one of claims 15 to 28, characterized in that crosslinkers added are metal chelates, especially aluminum chelates or titanium chelates, isocyanates, amines, alcohols and/or epoxides.

30. The method of any one of claims 15 to 29, characterized in that the polymers are crosslinked by actinic radiation, preferably using polyfunctional acrylates or methacrylates.

31. The method of any one of claims 15 to 30, characterized in that the polymers are crosslinked by UV radiation, preferably using UV-absorbing photoinitiators.

32. The use of a pressure-sensitive adhesive tape of any one of claims 1 to 14 for mounting printing plates, especially multilayer photopolymer printing plates, to printing cylinders or sleeves.